Amendments to the Claims

1. (currently amended) A torque sensor comprising:

a shaft comprising magnetostrictive material;

a pair of opposite permanent magnet poles defining an axis that is aligned tangentially to a circumferential surface of the shaft so as to induce a localized magnetic field in the magnetostrictive material between the opposite magnet poles, wherein the magnet poles are arranged with the shaft to induce the localized magnetic field during torque sensing with the torque sensor; and

at least one torque-sensing flux detector positioned to detect a component of the localized magnetic field which escapes from the magnetostrictive material when the shaft is torqued.

2. (previously presented) A torque sensor according to claim 1, wherein the at least one torque-sensing flux detector comprises a pair of torque-sensing flux detectors positioned on opposite sides of the shaft circumferentially displaced from the pair of opposite permanent magnet poles.

3. (previously presented) A torque sensor according to claim 1, further comprising a magnet-monitoring flux detector positioned to detect the magnetic field produced by one of the permanent magnet poles prior to penetration into the shaft.

4. (canceled)

5. (canceled)

6. (original) A torque sensor according to claim 1, wherein the shaft is hollow.

7. (original) A torque sensor according to claim 1, wherein the shaft is made substantially only from the magnetostrictive material.

8. (original) A torque sensor according to claim 1, wherein the shaft comprises a main body of non-magnetostrictive material and an outer layer of the magnetostrictive material.

9. (original) A torque sensor according to claim 1, wherein the shaft comprises a main body of magnetostrictive or non-magnetostrictive material surrounded by a layer of low permeability material which is in turn surrounded by an outer layer of the magnetostrictive material.

10. (previously presented) A torque sensor according to claim 9, wherein the pair of opposite permanent magnet poles are poles of a single magnet.

11. (currently amended) A steering column having a torque sensor comprising:

a shaft comprising magnetostrictive material;

a pair of opposite permanent magnet poles defining an axis that is aligned tangentially to a circumferential surface of the shaft so as to induce a localized magnetic field in the magnetostrictive material between the opposite magnet poles, wherein the magnet poles are arranged with the shaft to induce the localized magnetic field during torque sensing with the torque sensor; and

at least one torque-sensing flux detector positioned to detect a component of the localized magnetic field which escapes from the magnetostrictive material when the shaft is torqued.

12. (previously presented) A steering column according to claim 11, wherein the torque-sensing flux detector and a further torque-sensing flux detector are positioned on opposite sides of the shaft circumferentially displaced from the pair of opposite permanent magnet poles.

13. (currently amended) A torque sensor comprising:

a shaft comprising magnetostrictive material;

a first pair of opposite permanent magnet poles defining a first axis that is aligned tangentially to a circumferential surface of the shaft so as to induce a first localized magnetic field in the magnetostrictive material in a first circumferential direction;

a second pair of opposite permanent magnet poles arranged axially displaced along the shaft from the first pair of opposite magnet poles and defining a second axis that is aligned tangentially to the circumferential surface of the shaft so as to induce a second localized magnetic field in the magnetostrictive material in a second circumferential direction opposed to the first circumferential direction, wherein the first and second pairs of magnet poles are arranged with the shaft to induce the first and the second localized magnetic field during torque sensing with the torque sensor; and

first and second torque-sensing flux detectors positioned to detect first and second components of the first and second localized magnetic fields which escape from the magnetostrictive material when the shaft is torqued.

14. (currently amended) A gearbox having a torque sensor comprising:

a shaft comprising magnetostrictive material;

a pair of opposite permanent magnet poles defining an axis that is aligned tangentially to a circumferential surface of the shaft so as to induce a localized magnetic field in the magnetostrictive material between the opposite magnet poles, wherein the magnet poles are arranged with the shaft to induce the localized magnetic field during torque sensing with the torque sensor; and

at least one torque-sensing flux detector positioned to detect a component of the localized magnetic field which escapes from the magnetostrictive material when the shaft is torqued.

15. (previously presented) A gearbox according to claim 14, wherein the torque-sensing flux detector and a further torque-sensing flux detector are positioned on

opposite sides of the shaft circumferentially displaced from the pair of opposite permanent magnet poles.

16. (currently amended) A torque sensor comprising:

a shaft comprising magnetostrictive material;

a pair of opposite permanent magnet poles arranged on one side of the shaft and defining an axis that is aligned substantially perpendicular to a principal axis of the shaft so as to induce a localized magnetic field in the magnetostrictive material between the opposite magnet poles, wherein the magnet poles are arranged with the shaft to induce the localized magnetic field during torque sensing with the torque sensor; and

at least one torque-sensing flux detector positioned to detect a component of the localized magnetic field which escapes from the magnetostrictive material when the shaft is torqued.

17. (currently amended) A method of sensing torque comprising:

(a) providing a shaft comprising magnetostrictive material;

(b) applying an external magnetic field to the shaft during torque sensing using a pair of opposite permanent magnet poles defining an axis that is aligned tangentially to a circumferential surface of the shaft so as to induce a localized magnetic field in the magnetostrictive material between the opposite magnet poles;

(c) torquing the shaft so that a component of the internal magnetic field escapes from the magnetostrictive material; and

(d) detecting the escaped component of the internal magnetic field and providing a torque signal responsive thereto.

18. (previously presented) A method according to claim 17, wherein the detecting of the escaped component of the internal magnetic field is performed using a pair of torque-sensing flux detectors positioned on opposite sides of the shaft circumferentially displaced from the pair of opposite permanent magnet poles.